18. (a) Describe various ionization techniques used in mass spectroscopy. (5)

(b) Explore the applications of axial halo ketone rule. (5)

19. (a) Describe the mechanism of the Norrish Type I and Norrish Type II reactions. (6)

(b) Explain the Cope and Claisen rearrangement. (4)

20. (a) Mention any two methods for the synthesis of purine derivatives. (4)

(b) Explain the synthesis of Vitamin A1 using Wittig and Reformatsky method. (6)

APRIL/MAY 2024

DCH31/GCH31 — ORGANIC CHEMISTRY — III

Time : Three hours Maximum : 75 marks

Shanmuga Industries Arts & Science College T.V.Malai

SECTION A — (10 × 2 = 20 marks)

Answer ALL questions.

1. Calculate λ_{max} for 2-methyl-2-cyclohexanone.

2. How to distinguish benzoic acid from acetic acid using IR spectroscopy?

3. What is mean by spin-spin coupling?

4. How many carbon peaks appear for cinnamic acid? Mention its chemical shift values?

5. Write applications of nitrogen rule in mass spectroscopy.

6. What do you understand from the octant rule?

7. What is mean by radiative process from nonradiative process?

8. Draw HOMO and LUMO orbitals of 1,3,5—hexatriene.

9. Mention a method of synthesizing oxazole moiety.

10. Write the Baker-Venkataraman synthesis.

SECTION B — (5 × 5 = 25 marks)

Answer ALL questions.

11. (a) Discuss the role of Woodward-Fieser rules in UV-Vis spectroscopy.

Or

(b) Explain detection of hydroxy and amino compounds using IR spectroscopy?

12. (a) Discuss the basic principle of ^{1}H NMR spectroscopy.

Or

(b) Write a note on proton decouple ^{13}C NMR spectra.

13. (a) Explain the factors affecting cleavage pattern in mass spectroscopy.

Or

(b) Explain the applications of ORD.

14. (a) Discuss the mechanism of Buchi reaction and di-pi-methane rearrangement.

Or

(b) Using the FMO approach, prove that Diels-Alder cycloaddition is a thermally allowed reaction.

15. (a) Describe the conversion of cholesterol into oesterone.

Or

(b) How do we synthesize oxazole and thiazole rings?

SECTION C — (3 × 10 = 30 marks)

Answer any THREE questions.

16. (a) Explain the effect of solvent on absorption maxima of organic molecules in UV-Vis absorption spectroscopy. (5)

(b) Intra and intramolecular hydrogen bonding using IR spectroscopy.

17. (a) Discuss the factors influencing chemical shift values in NMR spectroscopy. (6)

(b) Give a brief note on the geminal and vicinal coupling. (4)